

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
20 April 2006 (20.04.2006)

PCT

(10) International Publication Number
WO 2006/041252 A1

(51) International Patent Classification⁷: E04H 6/18, 6/28

(21) International Application Number:
PCT/KR2005/002037

(22) International Filing Date: 29 June 2005 (29.06.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10-2004-0081055 11 October 2004 (11.10.2004) KR

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AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

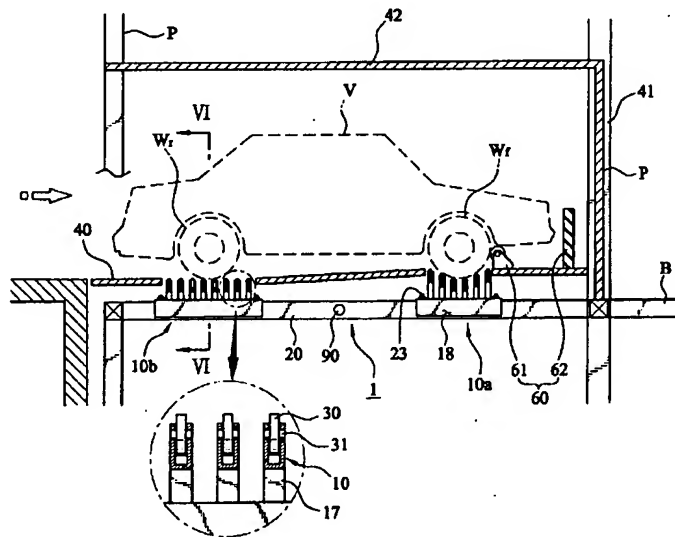
— with international search report

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

(54) Title: LOADING AND UNLOADING STAND FOR PALLETLESS PARKING SYSTEM



(57) Abstract: The loading and unloading stand for palletless rack type parking system is comprising of plural fork bars (10) arranged with a right angle to the car, and the fork bars (10) comprising a front fork row for sustaining front wheels of the car and a rear fork row for sustaining rear wheels of the car; longitudinal beam (20) arranged in a right angle against the fork bar, and supporting below the fork bar; plural rollers (30) being arranged along a width of the fork bar, the upper portion of the roller protruding above the top of the fork bar so as to allow wheels of the car to be rolling-contacted; a floor covering (40) above the longitudinal beam of the parking space except the fork bar row area; and a position adjustment unit (50) for transferring the car along the longitudinal direction of the fork bar so as to park the car on the accurate place.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 2005/002037

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁷: E04H 6/18, E04H 6/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: E04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 702 541 B1 (WAN YOUNG LEE) 9 March 2004 (09.03.2004) <i>figure 10, description, column 9, pages 9-30.</i>	1-14
A	US 5 338 145 A (FAUSTO BERETTA) 16 August 1994 (16.08.1994) <i>abstract, figures 5-7, description, column 5, page 26 - column 6, page 5.</i>	1-14

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search
1 September 2005 (01.09.2005)Date of mailing of the international search report
16 September 2005 (16.09.2005)Name and mailing address of the ISA/ AT
Austrian Patent Office
Dresdner Straße 87, A-1200 ViennaAuthorized officer
SENGSCHMITT D.

Facsimile No. +43 / 1 / 534 24 / 535

Telephone No. +43 / 1 / 534 24 / 384

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR 2005/002037

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
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				AU	A	8484491	1992-04-02
				MX	A1	9101260	1992-05-04
				CA	A1	2052223	1992-03-29
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12 Pgs SPEC,

Description

LOADING AND UNLOADING STAND FOR PALLETLESS PARKING SYSTEM

Technical Field

- [1] The present invention relates to a loading and unloading stand for palletless parking system, by which a few cars can park on a loading rack in an automatic loading/unloading way without using a pallet, and more particularly to the loading and unloading stand for palletless parking system, in which the stand is installed in a parking space of a rack for loading/unloading cars, by which the car can be loaded into or unloaded from the rack quickly and safely, and also the stand is used as the standby space for occupants of the car.

[2]

Background Art

- [3] In recent years, a rapid increase of vehicles causes the absolute lacking phenomena of parking places, so it becomes serious social problems of raising the difficulty of parking following by the traffic congestion and the environmental pollution. Particularly, the problem of parking places becomes more serious in very busy midtowns due to limited parking places.
- [4] In an effort to solve such problems of a shortage of parking places in busy cities, there have been attempted a variety of solutions, for example, strengthening of parking regulations and enacting of ordinances which oblige building owners to establish parking places in or around their building. However, the expansion of parking places couldn't help having a limitation due to the difficulty of securing lands in busy cities.
- [5] Therefore, as a solution for effectively parking many vehicles on limited areas is proposed a parking system that stores vehicles on floors in parking spaces using a mechanical drive unit, which is being widely used.
- [6] Such parking systems are generally classified into several types such as a circulation type system, a puzzle type system, and an elevator type system, etc., in accordance with a drive system. The elevator type system is widely used, which can simply and rapidly enter a vehicle into a designated parking space or deliver it therefrom.
- [7] In the elevator type system, a plurality of racks longitudinally arranged in a lattice form in each parking space is provided at a predetermined interval. A transfer equipment e.g., a lift or a stacker crane is equipped in the space between each rack in order to transfer the car. For instance, particular code numbers are designated to each car and stand, and the transfer equipment is interoperated with the controller so that the

car can automatically be loaded or unloaded.

- [8] Such an elevator type system is further classified as a pallet type and a palletless type depending on the presence of a pallet. Considering the structure of the parking system and time for the loading or unloading process, the tendency is to increase the adoption of the advantageous palletless type system.
- [9] The palletless type parking system is disclosed in Japanese Patent Laid-open Publication No. Heisei 5-52058, and Heisei 8-120964, and Utility Model Laid-open Publication No. Heisei 5-85953, and Korean Patent Laid-open Publication No. 10-2004-0024178. In this system, a stand of a rack and a fork of transfer equipment are comprised of a plurality of parallel bars. The parallel bars are arranged in a lattice form and in an up and down manner. The car can be loaded/unloaded between the stand and the transfer equipment.
- [10] However, since the conventional system is constructed as described above, the system has a problem in that there may be no guarantee for stable loading/unloading of car, and for safety take-on/take-off of occupants.
- [11] Since no car is loaded on an individual pallet, but a car placed on the transfer fork is directly moved using the transfer fork, there is no guarantee for a car to be loaded on the accurate parking place. Furthermore, it has more difficulty for a car to move onto the fork bars spaced away in a regular interval from each other. Worse yet, it accompanies danger that the occupants of the car should walk on the unstable fork bars on the loading/unloading process.

[12]

Disclosure of Invention

Technical Problem

- [13] Accordingly, the present invention has been made with taking the above problems occurring in the prior art into consideration, and an object of the present invention is to provide a loading and unloading stand for palletless parking system in which the car can be loaded/unloaded in the accurate place using a transfer equipment e.g., stacker crane, and also the occupants to get on/off the car safely.
- [14] In order to accomplish the above object, in a palletless rack type parking system comprised of a plurality of racks having a loading fork and a stacker crane for loading a car onto or unloading from the rack, and the stacker crane having a transfer fork arranged in a right angel to the loading fork, the transfer fork moving up or down in respect to the loading fork: the palletless rack type parking system is comprised of plural fork bars arranged lengthwise with an interval to each other and with a right angle to an approaching direction of the car, and the fork bars comprising a front fork row for sustaining front wheels of the car and a rear fork row for sustaining rear wheels

of the car, and the front fork row being spaced away from the rear fork row; longitudinal beam arranged in a right angle against the fork bar, and supporting below the fork bar, so that an passage end of the fork bar takes a form of cantilever, and fixedly mounting each fork bar on the rack; plural rollers being arranged in a proper interval in the fork bar and the rollers rotation center arranged along a width of the fork bar, the upper portion of the roller having an excessive protrusion above the top of the fork bar so as to allow wheels of the car to be rolling-contacted; a floor covering above the longitudinal beam of the parking space except the fork bar row area; and a position adjustment unit for transferring the car along the longitudinal direction of the fork bar so as to park the car on the accurate place.

[15]

Technical Solution

[16] In accordance with a preferred feature of this invention, the position adjustment unit is comprised of a pair of guide rails which are installed between two longitudinal beams being parallel to each other, a slider installed between the guide rails for making a reciprocation along the guide rail, plural push bars mounted on the slider in a right angle and projecting upright through the space between the fork bars, and for pushing wheels of the car in either a right or left direction, and an actuator for pushing the push bars.

[17] In accordance with a preferred feature of this invention, a projection tab is provided at the lower middle portion of the fork bar of the transfer bar with a proper height.

[18] According to the present invention, a loading and unloading stand for palletless storage system enables the car to be loaded/unloaded in the accurate place using a transfer equipment e.g., stacker crane, and also the occupants to get on/off the car safely.

[19]

Advantageous Effects

[20] Therefore, the present invention has an advantage, in quick and precise loading or unloading of the car into or from parking spaces can be accomplished and the operational reliability can be improved, considerably.

[21]

Brief Description of the Drawings

[22] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[23] FIG. 1 is a front view of a palletless rack type parking system having a loading and unloading stand according to a present invention;

- [24] FIG. 2 is a plan view taken along line II-II of FIG. 1;
- [25] FIG. 3 is a plan view schematically showing a loading and unloading stand installed on a palletless rack type parking system;
- [26] FIG. 4 is a plan view schematically showing a loading and unloading stand;
- [27] FIG. 5 is a side view of taken from a point V of FIG. 4;
- [28] FIG. 6 is a cross-sectional view taken along line VI-VI of FIG. 5;
- [29] FIG. 7 is an exploded perspective view of a fork bar of a loading and unloading stand;
- [30] FIG. 8 is a cross-sectional view of a fork bar assembly;
- [31] FIGS. 9 to 11 are side views showing various embodiments of a fork bar of a loading and unloading stand according to the present invention;
- [32] FIGS. 12 and 13 are a plan and a side view showing another embodiment of a fork bar of a loading and unloading stand, respectively;
- [33] FIG. 14 is a partially cutoff plan view showing an essential portion of a loading and unloading stand;
- [34] FIG. 15 is a cross-sectional view taken along line XV-XV of FIG. 14;
- [35] FIG. 16 is a side view showing a stopper of a loading and unloading stand;
- [36] FIGS. 17 to 21 are side views sequentially showing loading process of a loading and unloading stand; and
- [37] FIGS. 22 to 26 are side views sequentially showing unloading process of a loading and unloading stand.
- [38]

Best Mode for Carrying Out the Invention

- [39] This invention will be described in further detail by way of exemplary embodiments with reference to the accompanying drawings.
- [40] Referring to FIGS. 1 and 2, a palletless rack type parking system S, provided with a loading and unloading stand according to a present invention, is comprised with a plurality of racks R longitudinally arranged in a lattice form to have a loading fork L_F on each parking space and a stacker crane S_C provided between two adjoining racks R for moving in a three axis direction, the stacker crane S_C having a transfer fork T_F which moving toward, up or down, retracting from the side of the loading fork L_F and the stacker crane S_C for loading/unloading a car V to/from the loading fork L_F .
- [41] The structure is illustrated in Korean Patent Laid-open No. 10-2004-0024178 which has already been applied by the applicant, in which the loading fork L_F is comprised of a front fork row F_1 and a rear fork row F_2 being spaced away from each other and the front fork row F_1 sustaining front wheels of the car V and the rear fork row F_2 sustaining rear wheels of the car V.

- [42] The inventive loading and unloading stand 1 of the palletless pack type parking system is preferably provided at a predetermined parking space of the rack R, e.g. at a rim near the entrance of a first floor of the rack R.
- [43] The loading and unloading stand 1, as shown in FIGS. 3 to 6, is comprised of a plurality of fork bars 10 arranged lengthwise with a predetermined interval to each other, a longitudinal beam 20 arranged in a right angle against the fork bar 10 for fixedly mounting each fork bar 10 on the rack R, a plurality of rollers 30 rotationally mounted in each fork bar 10 with partly exposed upper portion, a floor 40 covering above the longitudinal beam 20 of the parking space except the fork bar row area 10a, 10b, and a position adjustment unit 50 for providing a sliding movement to the car V placed on the fork bar 10 along the roller 30.
- [44] The fork bar 10, similar to the loading fork L_F of the rack R, has a structure in which a front fork row 10a sustains front wheels W_f of the car V and a rear fork row 10b sustains rear wheels W_r of the car V, and the front fork row 10a is spaced away from the rear fork row 10b. The front fork row 10a, as shown in FIG. 5, has an arch configuration with which each fork bar 10 can contact the circumference of the front wheel W_f in order to maintain a stable support of the front wheel W_f as well as to provide the accurate stop position of the car V. The rear fork row 10b has a wide width in order to sustain the rear wheels W_r of various cars V having different length.
- [45] The diverse configurations of the fork bar 10 can be employed considering the structural stability of the fork bar and also the mounting way of the roller 30.
- [46] As shown in FIGS. 7 and 8, the fork bar 10 has approximate U shape in order to accommodate most portion of the roller 30 therein, and has a support hole 12 at each longitudinal wall 11 through which a shaft 31 of the roller 30 is rotationally assembled.
- [47] However, the fork bar 10 has a top open structure, foreign material can be stacked on the inner floor of the fork bar 10 after long-time use, resulting the interference with a rotation of the roller 30. Therefore, as a means for preventing the foreign substance accumulation, a plurality of foreign substance outlets 14 is formed at the floor 13 of the fork bar 10 along a longitudinal direction.
- [48] The prevention means for foreign substance accumulation can be configured as shown in FIGS. 9 and 10, in which a cover 15 is provided on the top of the fork bar 10 so that the upper part of the roller 30 is partially exposed, by which the entry of the foreign substance into the fork bar 10 can be prevented. Furthermore, as shown in FIG. 11, the prevention means for foreign substance accumulation is provided at the floor 13 of the fork bar 10, and at a same time the cover 15 is provided at the upper opening of the fork bar 10.
- [49] Since the roller 30 will be worn by long-time use, the roller 30 must be taken out from the fork bar 10 to be maintained or replaced. To get easy access to the roller 30,

as shown in FIGS. 12 and 13, an upper portion of the support hole 12 formed at the longitudinal wall 11 is left open. That is, the support hole 12 is configured with a U shape. Furthermore, each longitudinal side of the cover 15 covering the upper opening of the fork bar 10 has a pusher 16 that perpendicularly pushes the shaft 31 of the roller 30 toward the lower portion of the longitudinal wall 11. This structure can prevent the separation of the roller 30 from the fork bar 10 as well as the inflow of foreign substance into the fork bar 10. Also, the easy assembly and disassembly of the roller 30 can be secured.

- [50] The fork bar 10 may be attached on the longitudinal beam using a welding. However, since the roller 30 and other elements are installed in the fork bar 10, it is preferable that the fork bar 10 is made as a separation element and the fork bar 10 is placed on the longitudinal beam 20 in order to get convenience in process. To get the convenience, as shown in FIGS. 6 and 7, fork bars 10 are placed on two binder beams 18 which have a channel form and are arranged in a right angle to the fork bar 10 and spaced away in a parallel manner. The longitudinal beam 20, comprised of a first and a second longitudinal beams 21 and 22, runs through the inner channel of each binder beam 18. Two beams 20, 18 are assembled with a bolt 23.
- [51] On the other hand, in the middle rack R_2 , as shown in FIGS. 1 to 3, two cars can be loaded on the single middle rack in opposite direction, so that two transfer forks T_F can approach same loading fork L_F in opposite directions. This may bring about possibility of the safety accident to the occupants in the get-in or get-out process. Thus, in the stand of the present invention, any one of the transfer forks T_F approaches to only one side of the loading fork L_F , by which the other side of the loading fork L_F can be secured as the occupants passage.
- [52] In the loading and unloading stand 1 of the present invention, the loading fork L_F of the rack R can be served not as a parking station, but merely as a temporary waiting station for the car V that is loaded or unloaded. That is, it is not necessary that the transfer fork T_F of the stacker fork S_C must approach toward or retract from both sides of the stand 1. Furthermore, the marginal width for the car loading and unloading process can be secured as much as possible, so that it increases a safe-ability to the loading and unloading process of the car V.
- [53] In the edge rack R_1 , there is no passage space for the occupants. Thus, as shown in FIG. 3, a special passage for the occupants can be reserved at a fixed end of the fork bar 10.
- [54] No matter where the stand 1 is installed at the edge rack R_1 or at the middle rack R_2 , as shown in FIGS. 5 and 6, the longitudinal beam 20 is comprised of the first longitudinal beam 21 that supports the one end of the fork bar 10 and the second longitudinal beam 22 that supports the middle of the fork bar 10. On the other end of the

fork bar 10 takes a form of cantilever.

- [55] Each end of the longitudinal beam 20 is connected with a post P, and a traverse beam B that is placed between two adjacent posts P, respectively. The first and second longitudinal beams 21 and 22 can be substituted as a longer side beam of the rack R.
- [56] Since the second longitudinal beam 21 supports the lower portion of the middle of the fork bar 10, it needs marginal space for operation of the transfer fork T_F so that the movement of the transfer fork T_F does not interfere with the fork bar 10 when the transfer fork T_F approaches toward, moves up/down, and retracts from the fork bar 10 while unloading the car V.
- [57] The marginal space can be secured by a projection tab 17 provided at the lower middle portion of the fork bar 10 of the transfer bar T_F with a proper height. Otherwise, the projection tab 17 can be provided at the lower portion of the fork bar 10 of the stand 1. Alternatively, the projection tab 17 can be installed at both the fork bar 10 of the transfer bar T_F and the fork bar 10 of the stand 1, respectively.
- [58] Because the second longitudinal beam 22 should receive most load of the car V by nature, as shown in FIGS. 4 and 5, a weight sensor such as deflection sensor 90 can be installed at the central portion of the second longitudinal beam 22, by which the deflection of the second longitudinal beam 22 can be measured. The deflection sensor 90 can check the payload of the car V during the loading process. Thus, it is important to decide whether or not the car V is loaded or unloaded, so that the operation of the stacker crane S_c can be controlled.
- [59] If the deflection sensor 90 perceives an overweight car V, the deflection sensor 90 generates a signal and the signal is sent to a warning buzzer or a warning light (not shown), by which the buzzer or the light is activated on, so that an operator can be aware of the dangerous situation.
- [60] On the other hand, as shown in FIG. 5, since the shaft 31 of the roller 30 is rotationally installed at the support hole 12 formed at both longitudinal walls 11 of the fork bar 10, the rotational direction of the shaft 31 is the same as the approaching or the retracting direction of the car V toward/from the stand 1. Plural rollers 30 are arranged in a proper interval in the fork bar 10 along a longitudinal direction of the fork bar 10.
- [61] The smooth car movement, along the longitudinal direction in the loading and unloading operation, cannot be acquired in the case that the interval of each roller 30 is too wide or the upper portion of the roller 30 has an excessive protrusion above the top of the fork bar 10. Therefore, it is important that the distance between the roller 30 decreases and the top portion of the roller 30 can be exposed as little as possible to allow the roller 30 to make smooth rolling contact.
- [62] In the parking space, the floor 40 completely covers the longitudinal beam 20 and

the outer area of the fixed end area of the fork bar 10 except the front fork row 10a and the rear fork row 10b. The floor 40 is at the same level as the upper surface of the fork bar 10. Preferably, a wall 41 is installed along the outer block of the floor 40 where no loading and unloading of the car V can be established, which secures the safety of the occupants. A ceiling 42 is provided above the floor 40 as shown in FIG. 5.

[63] The position adjustment unit 50 can be employed as various configurations. For instance, as shown FIGS. 14 and 15, the position adjustment unit 50 is comprised of a pair of guide rails 51 which are installed between two longitudinal beams 21, 22 being parallel to each other, a slider 52 installed between the guide rails 51, plural push bars 53 mounted on the slider 52 for pushing the car V in either a right or left direction, and an actuator 54 for pushing the push bars 53.

[64] The pair of guide rails 51 has a channel configuration, in which each opening is facing each other, and one end of the guide rail 51 is firmly connected to the first longitudinal beam 21 and the other end of the guide rail 51 is firmly connected to the second longitudinal beam 22.

[65] The slider 52 has two wheels 55 which are installed in the guide rail 51, and a drive motor 56 that is connected to one wheel 55, the slider 52 can make reciprocation between the first longitudinal beam 21 and the second longitudinal beam 22.

[66] The push bar 53 is mounted on a support plate 57 for making an interaction to the fork bar 10. Each end of the push bar 53 has a protrusion 53a that is projected upright. The protrusion 53a is contacted with a sidewall of the wheels W_f , W_r of the car V.

[67] One end of the support plate 57 is connected with the slider 52 using a hinge 58, and another end of the support plate 57 is connected with the slider 52 using a piston rod 54a of the actuator 54 that is mounted upright on the slider 52.

[68] The car V must be loaded on the accurate parking spot, no matter if the car V has a different width. Preferably, a halt tab 59 can be provided at a middle upper surface of the fork bar 10, to which the wheels W_f , W_r of the car V are contacted when the car V moves in a traverse, thus restricting the further sliding movement of the car V.

[69] That is, when in the loading process, the sliding of the wheels W_f , W_r is interrupted by the halt tab 59, which can provide the accurate loading position of the car V.

[70] However, regardless of the width of the car V, the halt tab 59 cannot provide the loading and the unloading position accurately, but merely determine the limit for the sliding of the car V toward the loading position. The substantial sliding of the car V can be established by the reciprocation of the slider 52 actuated by the push bar 53.

[71] Therefore, the wheels W_f , W_r can be stopped before the wheels contact to the halt tab 59. Particularly, even if the inertia is applied to the car V that is sliding on the roller 30, no wheels W_f , W_r can hurdle the halt tab 59.

[72] Such a halt tab 59 has the same height as or more higher than the roller 30 that is

extruded up from the fork bar 10. It is more important that the halt tab 59 is made by material having superior frictional force to prevent the slide of the wheels W_f , W_r effectively.

- [73] It does not matter that only one halt tab 59 is installed at each fork bar 10. It is desirable that an auxiliary halt tab 59a can additionally be installed at the roller 30 provided at the free end portion of the fork bar 10. It is why the car V will not be excessively offset toward the free end of the fork bar 10, or will not be detached from, while the wheels W_f , W_r of the car V having a wide width are in contact with the halt tab 59 provided at the middle of the fork bar 10.
- [74] A stopper 60 is further, as shown in FIG. 5, provided between the front fork row 10a of the stand 1 and the front post P, which prevents the excessive entry of the car V into the front post P. The stopper 60 may take various configurations, for instance, as shown in FIG. 16, a wheel stop roll 61 can be mounted on the floor 40 between the front wheel W_f and the front post P, which contacts with the front wheel W_f , so as to block the further access of the wheel W_f to the front post P.
- [75] However, since the distance between the front wheel W_f and the front bumper can be different depending on the model of the car V, as shown FIG. 5, it is feared that the front bumper of a large size car can collide against the post P of the rack R even if the front wheel W_f is contacted with the wheel stop roll 61.
- [76] It is more desirable that a bumper wall 62 having a proper height is installed between the wheel stop roll 61 and the wall 41, which is in contact with the front bumper of the car V so it will restrain the access of the car V. The bumper wall 62 as well as the wheel stop roll 61 can prevent the excessive entry of the car V regardless of the size of the car V, which shelters the rack R. Further, if in some cars, the distance between the front wheel W_f and the front bumper is out of limit in respect to the rack R, no loading of the car having out of limit can be advanced.
- [77] As shown FIG. 4, number 70 is a falling prevention sill that is installed at an edge of the floor 40, toward which the transfer fork T_F of the stacker crane S_c moves. Number 80 is a buffer post that is installed at both sides of the stand 1, by which the rack is protected from the collision of the car V at any time.
- [78] The operation of the palletless rack type parking system S, provided with a loading and unloading stand according to the present invention will be described herein below with reference to FIGS. 17 and 26.
- [79] Firstly, as shown in FIG. 5, when in a loading process of the car V, the car V approaches into the stand 1 of the rack R, and when the front wheels W_f are placed on the front fork row 10a, the car V pulls up. The length of the fork bar 10, as shown in FIG. 4, is twice as long as a width of the car V, thus being able to park a car V in two columns in the stand 1. However, in this present invention, only one car V must

approach into the stand 1, which allowing the car V to be loaded safely and easily.

[80] Further, since the wheel stop roll 61 that is in contact with the front wheel W_f and the bumper wall 62 that is in contact with the front bumper of the car V are installed between the front fork row 10a and the front post P, excessive approaching of the car V can be effectively prevented, and the each wheel W_f , W_r is safely placed on respective fork row 10a, 10b. At this time, as shown in FIG. 17, the position adjustment unit 50 is at the farther side of the fixed end of the fork bar 10 and each inside protrusion 53a of the push bar 53 is at the lowest position, which provides no interruption to the wheels W_f , W_r .

[81] After the car V stops, the occupants get out the car V and step out onto the stand 1 through the floor 40. The drive motor 56 of the slider 52 runs and the slider 52, as shown in FIG. 18, moves to the free end of the fork bar 10 along the guide rail 51. Each outer protrusion 53a of the push bar 53 is contacted to the sidewall of the wheels W_f , W_r respectively so that the car V is moving to the free end of the fork bar 10.

[82] The wheels W_f , W_r placed on the rollers 30 protrude above the fork bar 10 which allow rotation to the rollers 30 by the thrust force of the push bar 53 generated by the movement of the slider 52. The wheels W_f , W_r move smoothly to the free end of the fork bar 10.

[83] Successively, as shown in FIG. 19, as the slider 52 arrives at the second longitudinal beam 22, the rotation of the drive motor 56 stops and the sliding movement of the wheels W_f , W_r ends. In some cars having extra wider width, the wheels W_f , W_r already contact the auxiliary halt tab 59a before the slider 52 reaches to the second longitudinal beam 22, thus halts the sliding of the car V and refuses the loading of the car V.

[84] Furthermore, when the deflection sensor 90 installed at the middle of the second longitudinal beam 22 detects the over-payload of the car V in respect with the allowable weight, the loading of the car V is also refused, and the weight warning is issued.

[85] After accomplishing the normal loading, the drive motor 56 turns in a reverse direction. As shown in FIG. 20, the slider 52 moves back toward the first longitudinal beam 21, and stays in place, being adjacent to the first longitudinal beam 21. If the slider 52 remains at the place near the second longitudinal beam 22, no entry of the transfer fork T_f into the fork bar 10 can be achieved due to the interruption between the slider 52 and the transfer fork T_f .

[86] Next, the stacker crane S_c on the standby starts the operation, and the transfer fork T_f installed on the stacker crane S_c , as shown in FIG. 21, approaches toward, moves up or down, retracts from the fork bar 10 of the stand 1 in a linear manner. Finally, the transfer fork T_f having the car V thereon searches for the empty loading fork L_f of the

rack R, and moves to the loading fork L_F in order to park the car V on the loading fork L_F .

[87] When in the unloading process of the car V, as shown in FIGS. 22 to 26, the above steps can be used in the reverse order. On issuing the unloading signal, the stacker crane S_C approaches to the loading fork L_F of the corresponding rack R. The car V placed on the loading fork L_F is loaded onto the transfer fork T_F . The transfer fork T_F reaches the loading and unloading stand 1 and unloads the car V onto the fork bar 10 as shown in FIG. 22.

[88] Subsequently, as shown in FIG. 23, the slider 52 on the standby, near the first longitudinal beam 21, moves toward the second longitudinal beam 22, and the movement of the slider 52 stops after each protrusion 53a provided at the fixed end of each push bar 53 contacts with the outer rim of the wheels W_f , W_r placed on the fork bar 10.

[89] Next, as shown in FIG. 24, the actuator 54 lifts up the protrusion 53a provided at the free end of the push bar 53. The protrusion 53a is extruded up through the space between the fork bars 10, and the push bar 53 maintains its horizontal state.

[90] Thereafter, as the drive motor 56 runs in a reverse direction, the slider 52 starts to move back toward the first longitudinal beam 21 as shown in FIG. 25. Each free end protrusion 53a of each push bar 53 is contacted with the inner rim of the wheels W_f , W_r , so that the wheels W_f , W_r move toward the fixed end of the fork bar 10.

[91] The wheels W_f , W_r placed on the rollers 30 protruded above the fork bar 10 give rotation to the rollers 30. The wheels W_f , W_r move smoothly toward the first longitudinal beam 21. As the slider 52 reaches the first longitudinal beam 21, the drive motor 56 stops so that the sliding wheels W_f , W_r also do not proceed.

[92] As soon as the car V is placed in the unloading position, the actuator 54 is OFF and the free end 53a of the push bar 53 is return to the lower position as shown in FIG. 26. After accomplishing the above process, the occupants get in the car V. The car V leaves the parking space, thus finishing the unloading process.

[93]

Industrial Applicability

[94] As described above, according to the present invention, a loading and unloading stand for palletless storage system enables the car to be loaded/unloaded in the accurate place using a transfer equipment e.g., stacker crane, and also the occupants to get on/off the car safely.

[95] Furthermore, only one car can be parked in the parking spaces where two cars can park in two columns, thus securing the wider waiting space for being required at the loading/unloading process. That leads to the easier access of the car. Particularly, the loading and the parking position of the car can be maintained consistently.

[96] Therefore, the present invention has an advantage, in quick and precise loading or unloading of the car into or from parking spaces can be accomplished and the operational reliability can be improved, considerably.

[97]

2 - Pgs Ch

Claims

- [1] 1. A palletless rack type parking system comprised of a plurality of racks having a loading fork and a stacker crane for loading a car onto or unloading from the rack, and the stacker crane having a transfer fork arranged in a right angel to the loading fork, the transfer fork moving up or down in respect to the loading fork, the palletless rack type parking system comprising:
- plural fork bars arranged lengthwise with an interval to each other and with a right angle to an approaching direction of the car, and the fork bars comprising a front fork row for sustaining front wheels of the car and a rear fork row for sustaining rear wheels of the car, and the front fork row being spaced away from the rear fork row;
- longitudinal beam arranged in a right angle against the fork bar, and supporting below the fork bar, so that an passage end of the fork bar takes a form of cantilever, and fixedly mounting each fork bar on the rack;
- plural rollers being arranged in a proper interval in the fork bar and the roller rotation center arranged along a width of the fork bar, the upper portion of the roller having an excessive protrusion above the top of the fork bar so as to allow wheels of the car to be rolling-contacted;
- a floor covering above the longitudinal beam of the parking space except the fork bar row area; and
- a position adjustment unit for transferring the car along the longitudinal direction of the fork bar so as to park the car on the accurate place.
2. The palletless rack type parking system according to claim 1, wherein: the fork bar has approximate U shape, and the roller is rotationally assembled at each longitudinal wall of the fork bar, and a plurality of foreign substance outlets is formed at the floor of the fork bar along a longitudinal direction.
3. The palletless rack type parking system according to claim 2, wherein: a cover is further provided on the top of the fork bar so as to prevent the entry of the foreign substance.
4. The palletless rack type parking system according to claim 3, wherein: a support hole is formed at both longitudinal walls of the fork bar, an upper portion of the support hole is left open so as to support rotation of the roller shaft, plural pushers are each longitudinal side of the cover covering the upper opening of the fork bar and perpendicularly push the shaft of the roller toward the lower portion of the longitudinal wall.
5. The palletless rack type parking system according to claim 1, wherein: the fork bar has approximate U shape, and the roller is rotationally assembled at each lon-

gitudinal wall of the fork bar, and a cover is provided on the top of the fork bar so as to prevent the entry of the foreign substance.

6. The palletless rack type parking system according to claim 1, wherein: the position adjustment unit is comprised of a pair of guide rails which are installed between two longitudinal beams being parallel to each other, a slider installed between the guide rails for making a reciprocation along the guide rail, plural push bars mounted on the slider in a right angle and projecting upright through the space between the fork bars, and for pushing wheels of the car in either a right or left direction, and an actuator for pushing the push bars.

7. The palletless rack type parking system according to claim 6, wherein: a halt tab is provided at a middle upper surface of the fork bar, by which the further sliding movement of the car is restricted when the car moves in a traverse.

8. The palletless rack type parking system according to claim 7, wherein: an auxiliary halt tab can additionally be installed at the upper exterior of the roller provided at the free end portion of the fork bar, by which excess sliding of the car is prevented.

9. The palletless rack type parking system according to claim 1, wherein: a projection tab is provided at the lower middle portion of the fork bar of the transfer bar with a proper height.

10. The palletless rack type parking system according to claim 1, wherein: a stopper is further provided for preventing the excessive entry of the car along the fork bar.

11. The palletless rack type parking system according to claim 10, wherein: the stopper is a wheel stop roll that is mounted on the floor between the front wheel and a front bump of the car, which contacts with the front wheel.

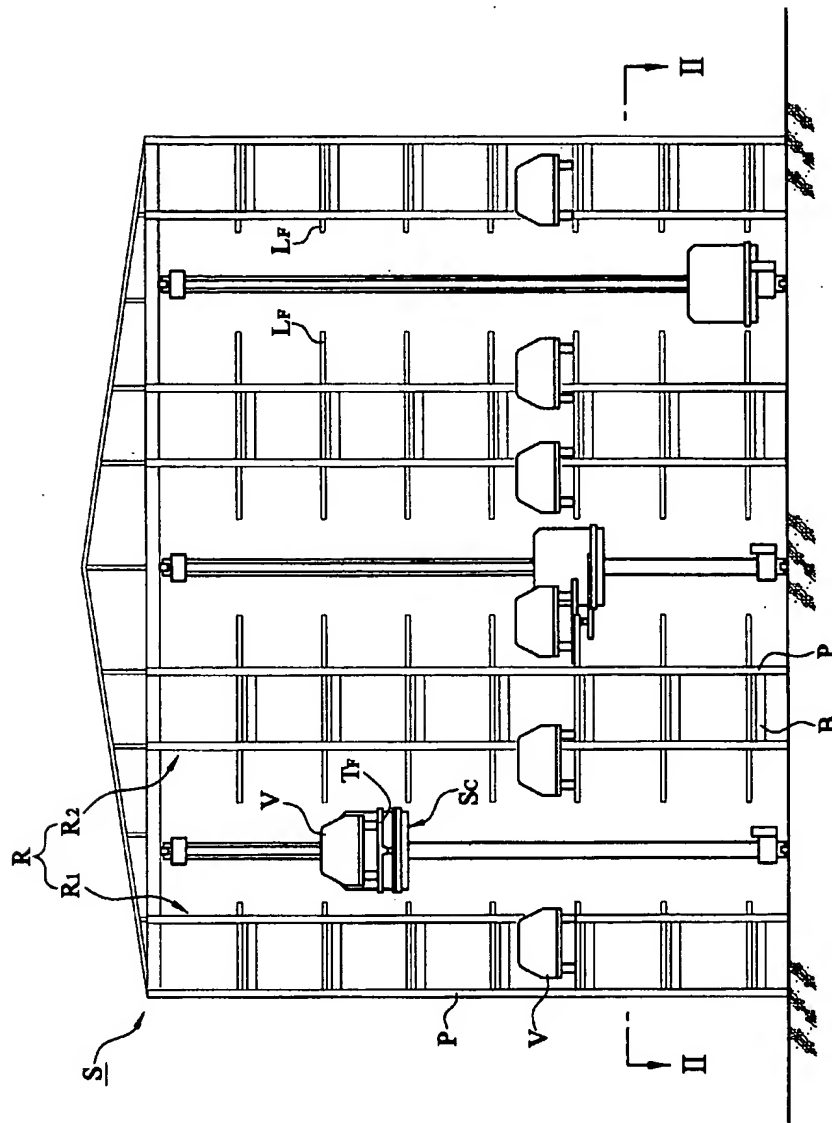
12. The palletless rack type parking system according to claim 11, wherein: the stopper is further provided a bumper wall having a proper height that is installed behind the wheel stop roll, which is in contact with the front bumper of the car.

13. The palletless rack type parking system according to claim 1, wherein: the fork bars are placed on two binder beams which have a channel form and are arranged in a right angle to the fork bar and spaced away in a parallel manner, and the binder beam is assembled with the longitudinal beam therethrough.

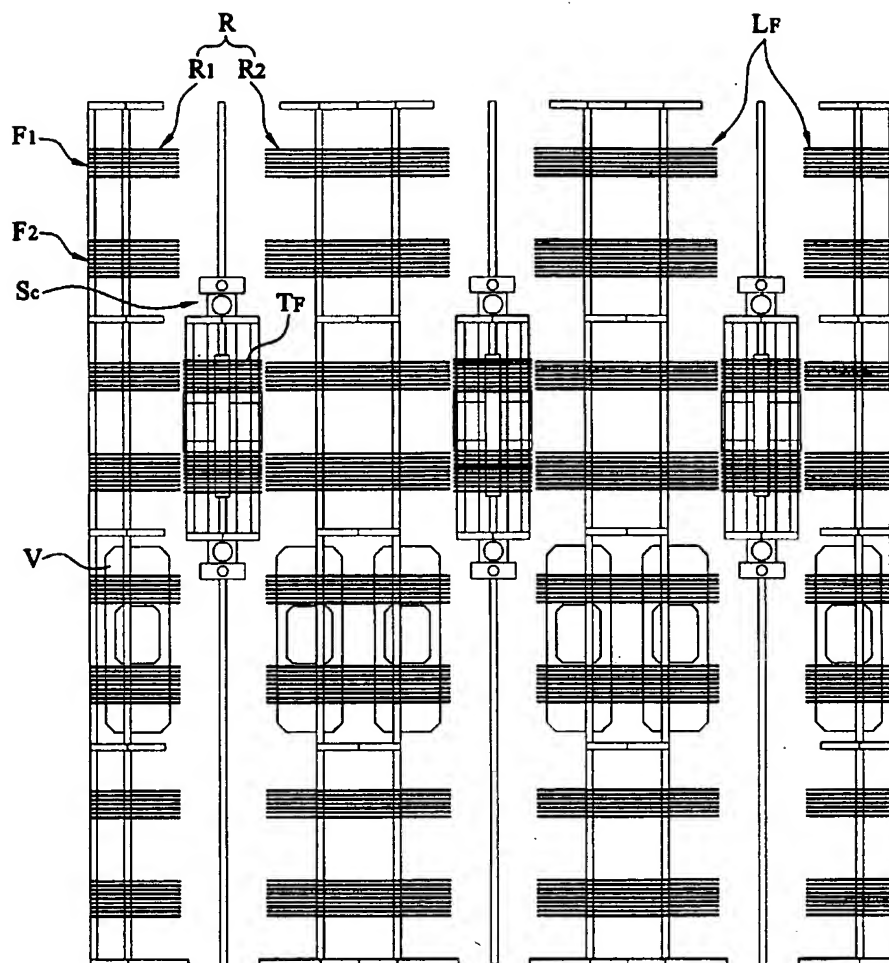
14. The palletless rack type parking system according to claim 1, wherein: a weight sensor is installed at the central portion of the longitudinal beam, by which the deflection owing to the load of the car is measured, by which makes decision whether or not the car is loaded or unloaded.

18- Pgs D RWS

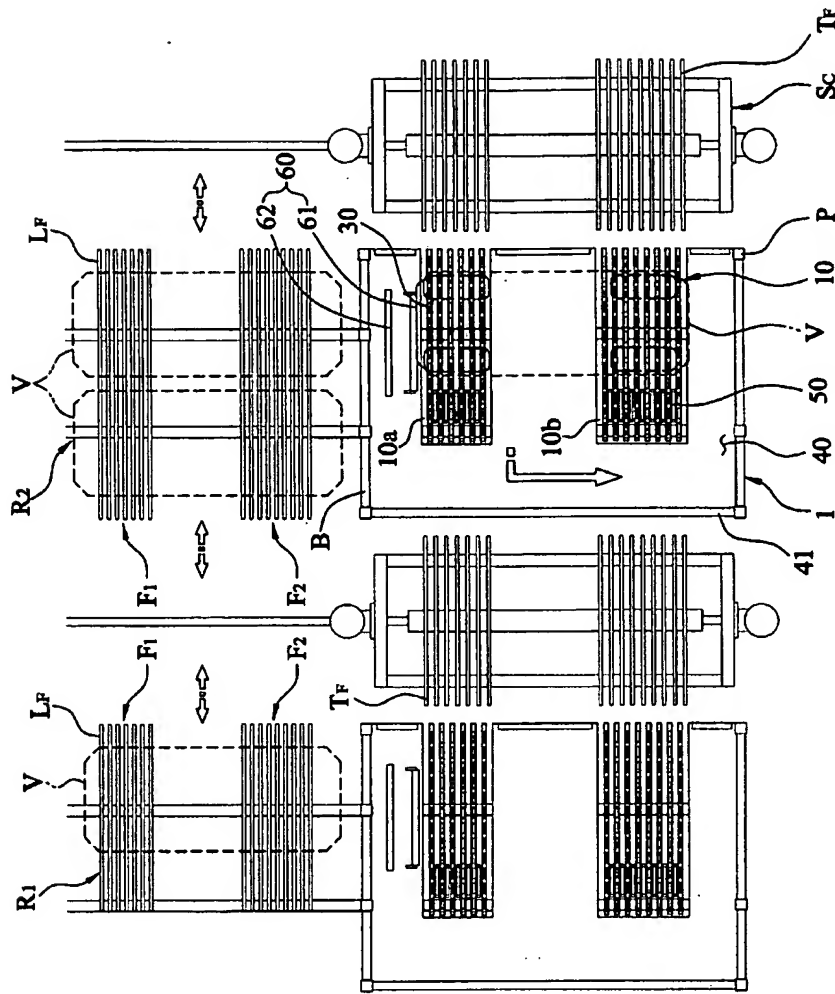
[Fig. 1]



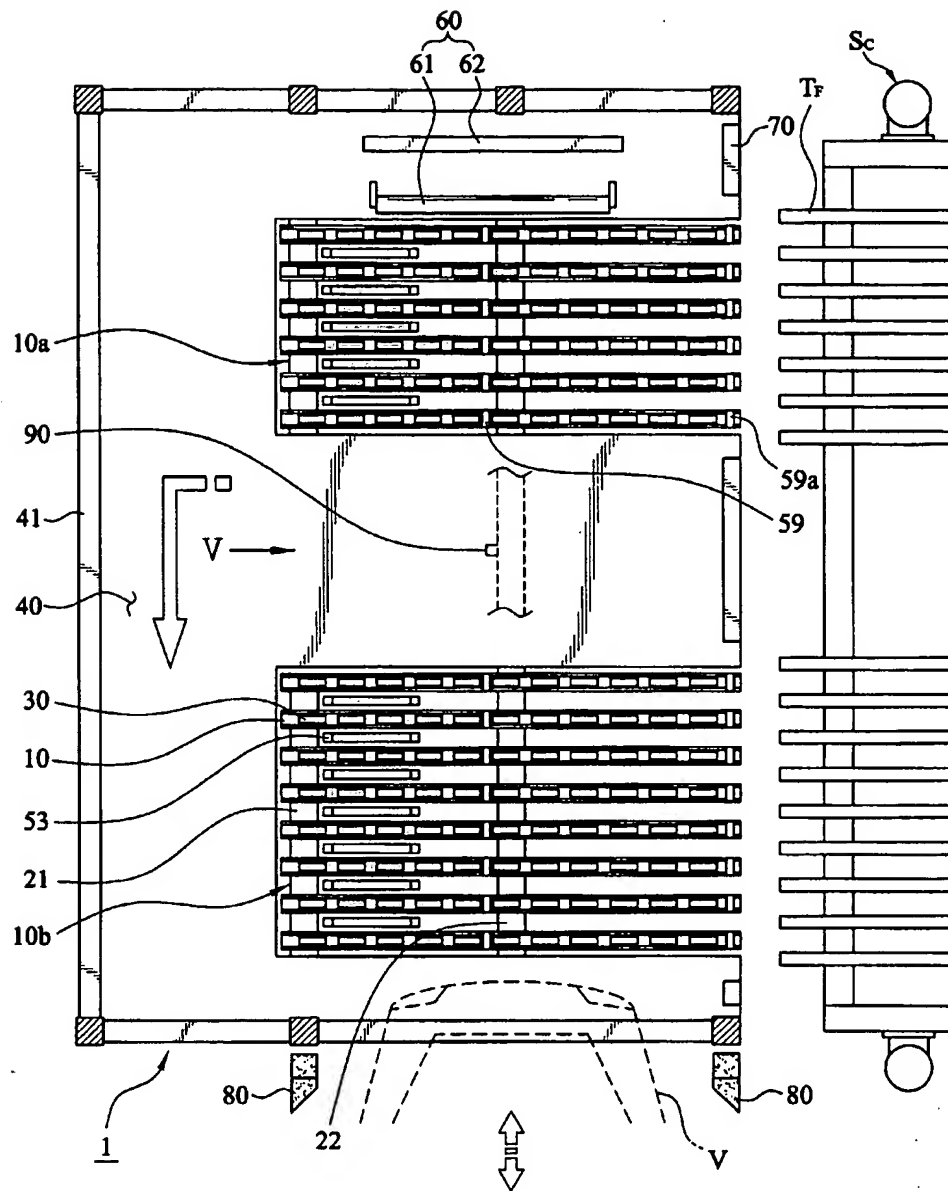
[Fig. 2]



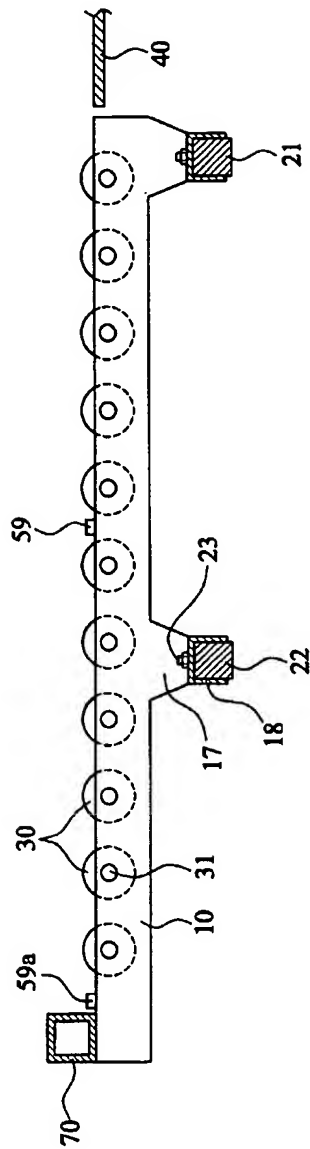
[Fig. 3]



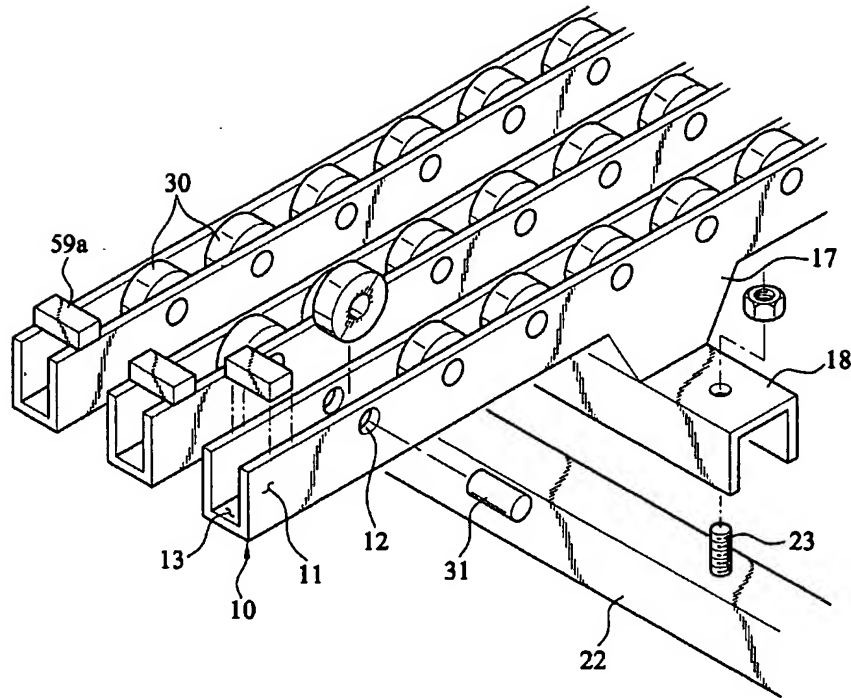
[Fig. 4]



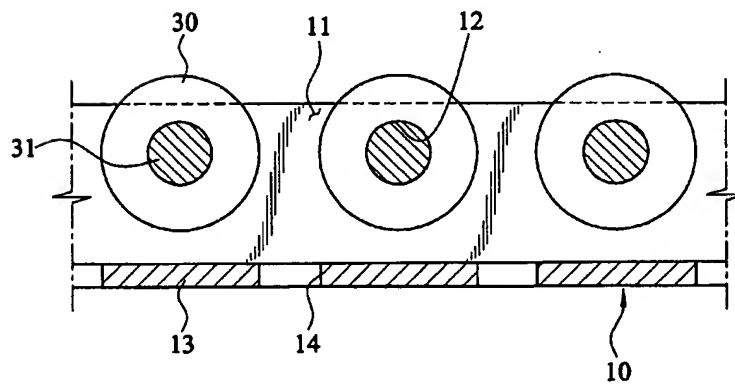
[Fig. 6]



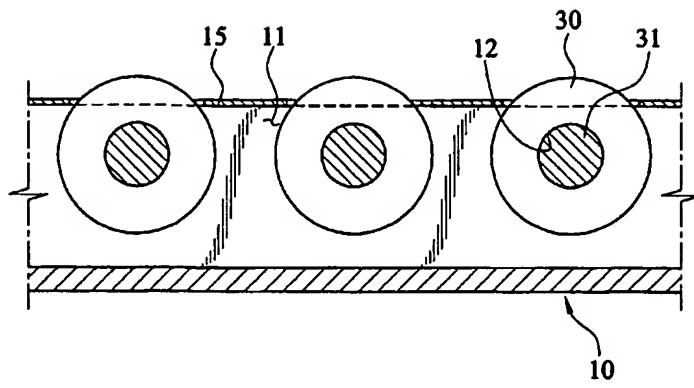
[Fig. 7]



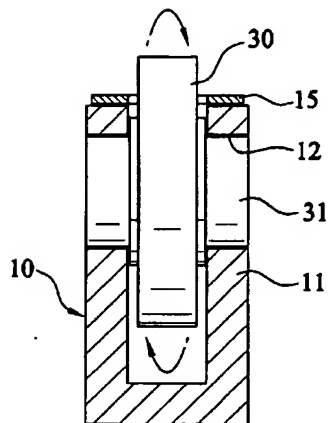
[Fig. 8]



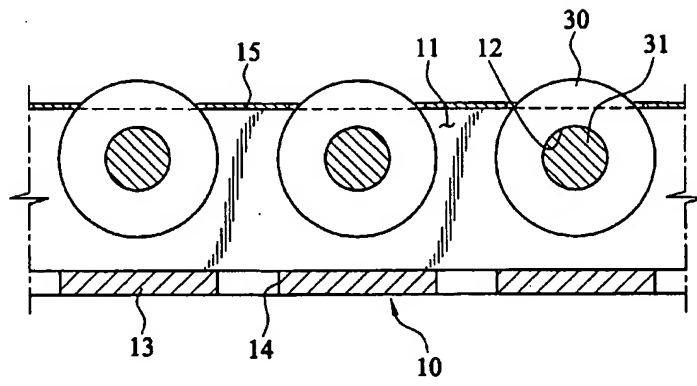
[Fig. 9]



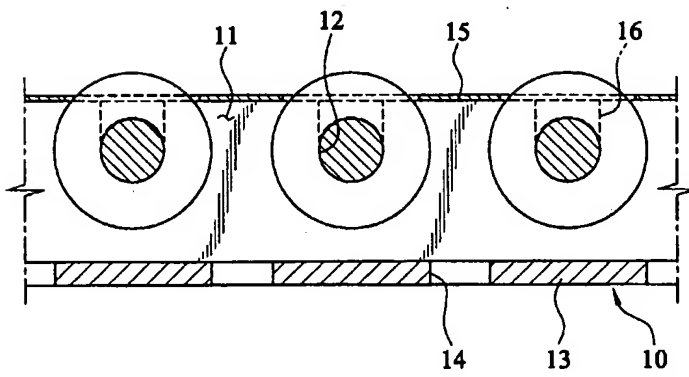
[Fig. 10]



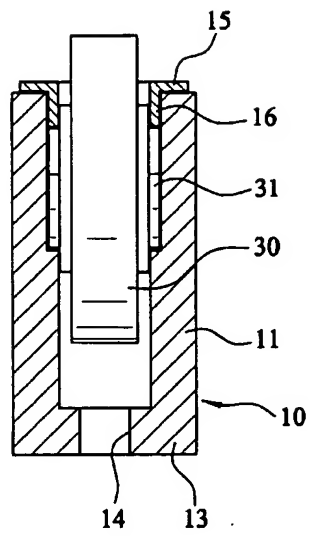
[Fig. 11]



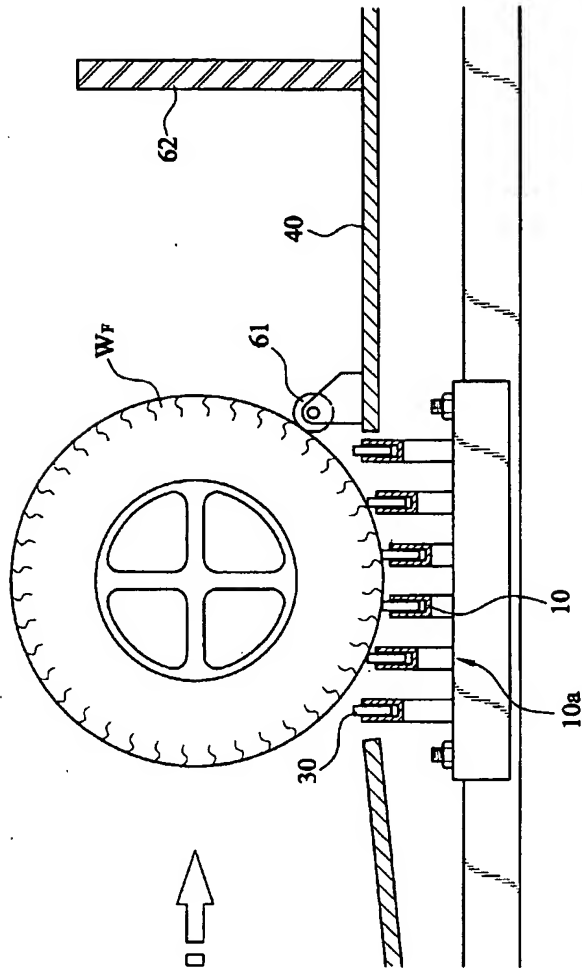
[Fig. 12]



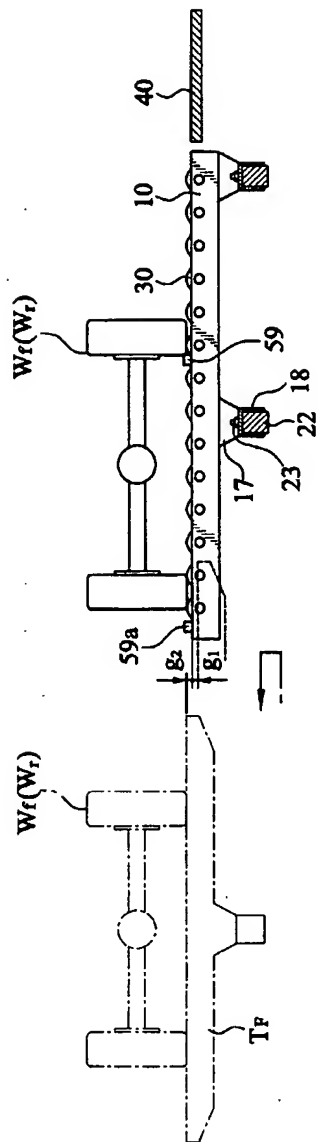
[Fig. 13]



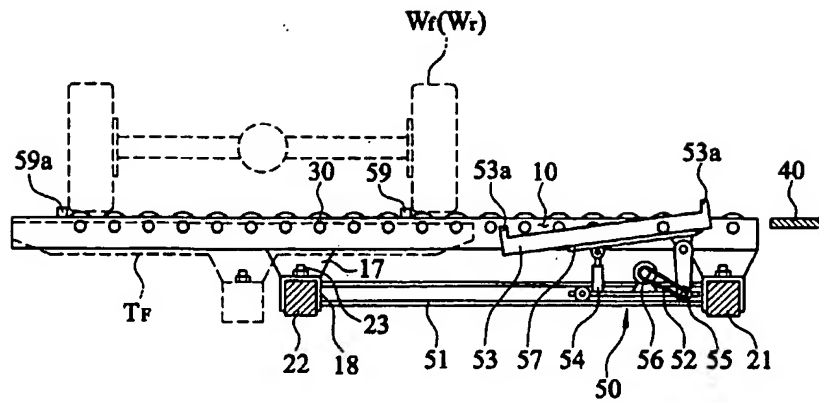
[Fig. 16]



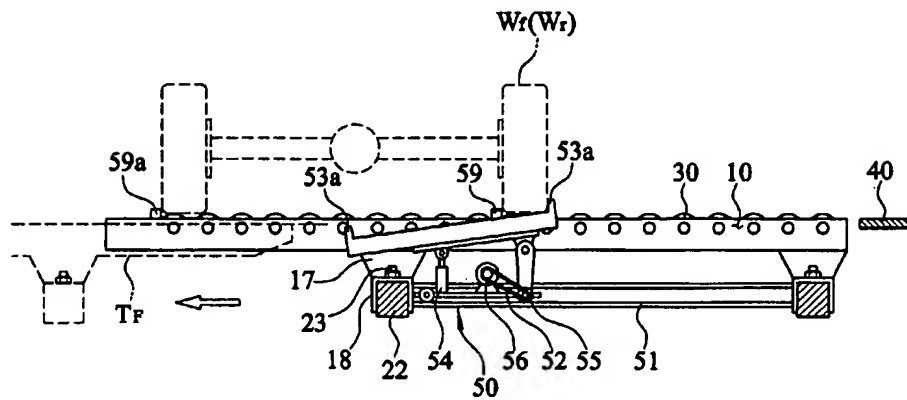
[Fig. 21]



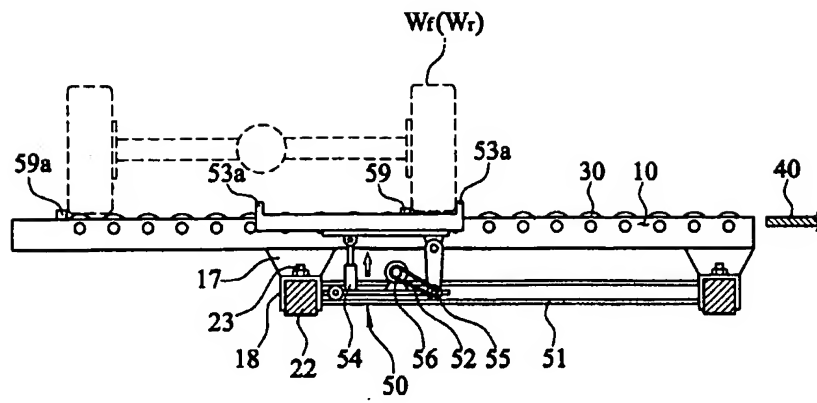
[Fig. 22]



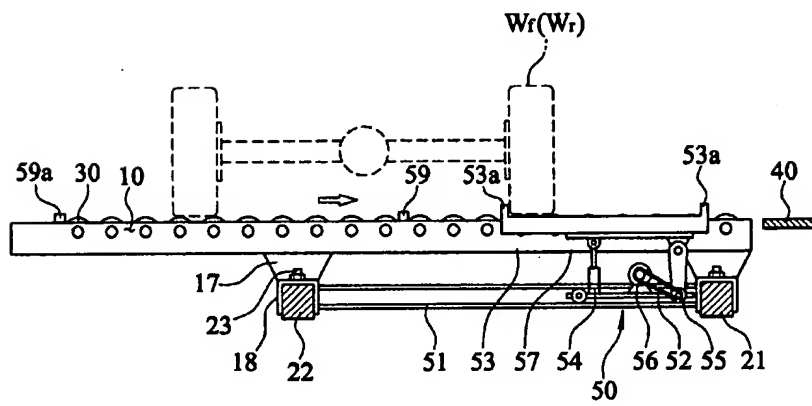
[Fig. 23]



[Fig. 24]



[Fig. 25]



[Fig. 26]

